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SHARKS IN LAKE NICARAGUA.

In a letter in the issue of *Science* for August 25, 1893, Mr. C. H. Ames raises the question of the existence of sharks in Lake Nicaragua and seems inclined to attribute to fiction the accounts of their presence which have from time to time been given. The reading of Mr. Ames's letter reminded me of a visit to this lake made by my friend, Mr. Charles W. Richmond, of the U. S. National Museum, and of the narrative he gave me, on his return, of his personal experience with the sharks. Mr. Richmond passed a year in Nicaragua in making natural history collections, and spent considerable time on Lake Nicaragua and the two rivers, the Frio and San Juan, which connect with it on the south; his visit occupied parts of the years 1892 and 1893. He has kindly furnished me some interesting notes on the fresh-water sharks inhabiting Lake Nicaragua and its tributaries, which I venture to present, although a contribution on this subject from the erudite Professor Theodore Gill, which I understand has been sent to *Science*, may render the present remarks supererogatory.

There seems little ground at this time for doubting the existence of sharks in this region. They are mentioned in the works of Belt, Squier, and other writers on Nicaragua and Central America, they are so well known to the inhabitants of the country as to occasion little comment; and they have been recorded and described by several ichthyological writers.

The information gathered by Mr. Richmond and his personal observations tend to indicate that the sharks are quite abundant. Two well-informed men, whose business was the hunting of wadding birds for their plumes, reported to him that they frequently saw sharks, and the captain of one of the lake steamers, a resident of that region for more than thirty years, spoke of sharks as being particularly numerous near Granada, where they remain in the vicinity of the steamer when it is moored there. At San Carlos, two Americans, who made frequent fishing excursions on the lake, mentioned the occurrence of sharks as not unusual.

Mr. Richmond saw a shark in the Rio Frio many miles from its mouth. This river flows into the San Juan just

below the lake; on some maps it is incorrectly made to empty into the lake. The example in question swam back and forth near the bank of the river, and did not take alarm even after several balls had been fired at it from a rifle. It was in plain sight, and Mr. Richmond had an excellent opportunity to estimate its length, which appeared to be about five feet. During his voyage down the river in a row boat, his companion, a Mr. Hausen, stopped one morning to fish from a snag in midstream. The fish bit well and he had some excellent sport. Once he attempted to haul in a very desirable fish, and had got it partly out of the water, when a shark seized it and took both fish and hook. The shark came very near to the gentleman and presented its head in uncomfortably close proximity to his foot. Mr. Hausen had made a number of trips up the Rio Frio and had seen sharks there before.

Sharks are found in all parts of the San Juan River, which drains Lake Nicaragua. They are particularly abundant at Castillo Viejo, where the telegraph operator of the canal company whiles away his leisure hours in catching them. Mr. Richmond saw several at this point, doubtless attracted by the flesh of a monkey's skull which he threw into the stream. The Machuca rapids below Castillo make it impossible for salt water to reach that place, and the sharks seen were presumably the same as those infesting the lake.

The shark inhabiting the lake apparently does not reach a large size, as we are accustomed to judge sharks on our coasts. Four or five feet seems to be the average length attained.

The presence of this representative of a typically marine order of fishes in Lake Nicaragua is not the only interesting feature of the fish fauna of this body of water. Mr. Richmond refers to another order of salt-water fishes, closely related to the sharks, which is represented by a large species, the sawfish (*Pristis*). The plume hunters before mentioned reported seeing individuals about three feet in length, and their occurrence was also confirmed by Captain Augustine, of the steamer "Managua." Systematic investigation of the fauna of this lake will doubtless disclose the existence of other animals, appar-

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ently out of their element, going to prove that at some remote period the present lake bed was simply a part of the sea bottom, which was thrown up by volcanic action with the supernatant water and its inhabitants.

In the Escondido River, which enters the sea on the Mosquito Coast, Mr. Richmond found sharks as far up as De Rama, sixty-five miles from its mouth. During the dry season, a period of very brief duration, the water is brackish at high tide at this distance. Several sharks, from two to four feet long, were caught here while the water was perfectly fresh. It is not known, however, that these were of the same species as those inhabiting the lake.

HUGH M. SMITH.

U. S. Fish Commission, Washington, D. C.

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